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(54) **DISPLAY DEVICE**

(57) The present invention relates to the field of display technology, and discloses a display device, which comprises a display panel and a backlight module, a shading tape being provided between the backlight module and the display panel along the edges of the display panel. In the edges of the display panel, an edge near the light strip and having a extending direction parallel to that of the light strip is a light incoming edge, and each end of the light incoming edge forms a light incoming corner with an end of an adjacent edge; the shading tape provided at each the light incoming corner, the shading tape provided at the main body of the light incoming edge, and the shading tape provided at the main body of the adjacent edge forming the light incoming corner with the light incoming edge are separate from each other; in the side, which faces the display panel, of the shading tape provided at the edges of the display panel, only the shading tape provided at the parts, except the light incoming corner, of the edges of the display panel is provided with an adhesive layer. A phenomenon of water ripple and light leakage does not easily occur at the portion of the display panel of the display device which corresponds to the light incoming corner.

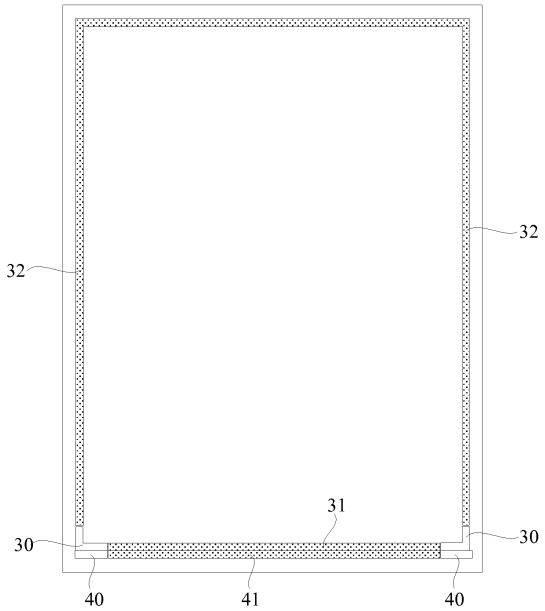

Fig.2

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Description

TECHNICAL FIELD

[0001] The invention refers to a technical field of display, and specifically to a display device.

BACKGROUND

[0002] Currently, a display device of intermediate or small size includes a display panel and a backlight module for providing light source for the display panel, which backlight module includes a back plate, a light guide plate and a light strip mounted in the back plate. The display panel is mounted on the back plate of the backlight module, and a shading tape disposed along the edges of the display panel is provided between the display panel and the back light module, for preventing light leakage defect from occurring in the display device.

[0003] In the backlight module, a side of the light guide plate that is provided with a light strip is a light incoming side, and an edge at which the side of the display panel's sides which is opposite to the light incoming side of the backlight module is a light incoming edge. An end of the light incoming edge forms a light incoming corner with an end of an edge, and the other end of the light incoming edge forms a light incoming corner with an end of another edge. Since the light intensity incoming from a side of the light incoming surface of the light guide plate is larger, for achieving good shading effect, the shading tape at the light incoming edge and the light incoming corner of the display panel has a larger width. Beside, for the commercial requirement of thinning product, the display panel is increasing thinner, and an extrusive stress easily occurs when the corner of the thinning display panel is stuck by large area, resulting in water ripple in the picture of the display panel. Therefore, a phenomenon of water ripple and light leakage easily occurs in a portion of the display panel which corresponds to the light incoming corner.

SUMMARY

[0004] The invention provides a display device, wherein a phenomenon of water ripple and light leakage does not easily occur in a portion of a display panel which corresponds to a light incoming corner.

[0005] For achieving the above object, the invention provides the following technical solution:

> A display device, comprising a display panel and a backlight module, which backlight module comprises a back plate, a light guide plate and a light strip mounted in the back plate, the display panel being mounted on the back plate, and a shading tape disposed along the edges of the display panel being provided between the backlight module and the display panel; in the edges of the display panel, each end of an edge close to the light strip and having a extending direction parallel to that of the light strip, i.e. a light incoming edge forms a light incoming corner with an end of an adjacent edge; the shading tape provided at each light incoming corner, the shading tape provided at the main body, except the ends, of the light incoming edge, and the shading tape provided at the main body, except the ends, of the adjacent edge forming the light incoming corner with the light incoming edge are separate from each other; in the side, which faces the display panel, of the shading tapes provided at the edges of the display panel, only the shading tape provided at the parts of the edges of the display panel except the light incoming corners is provided with an adhesive layer.

[0006] In the display device, the shading tape provided at each light incoming corner, the shading tape provided at the main body of the light incoming edge, and the shading tape provided at the main body of the adjacent edge forming the light incoming corner with the light incoming edge are separate from each other, that is have a separated structure; and only the shading tape provided at the parts of the edges of the display panel except the light incoming corners is provided with an adhesive layer, that is, the side, which faces the display panel, of the shading tape provided at the light incoming corners is not provided with an adhesive layer, i.e. does not been stuck to the display panel, so the parts of the display panel which correspond to the light incoming corners would not create extrusive stress due to the sticking of the shading tape. Therefore, a phenomenon of water ripple and light leakage does not easily occur in a portion of a display panel which corresponds to a light incoming corner.

[0007] Accordingly, a phenomenon of water ripple and light leakage does not easily occur in a portion, which corresponds to a light incoming corner, of the display panel of the display device.

[0008] Preferably, a side, which faces the backlight module, of the shading tape provided at the edges of the display panel is provided with an adhesive layer.

[0009] Preferably, the shading tape is located between the display panel and the back plate.

[0010] Preferably, the backlight module further comprises a prism mounted in the back plate and located between the light guide plate and the display panel, a protection layer located between the prism and the display panel; the shading tape is located between the display panel and the protection layer of the backlight module.

[0011] Preferably, the display panel comprises a lower polarizer, an array substrate, a liquid crystal layer, a color film layer and a upper polarizer which are arranged in turn from the light incoming side to the light outgoing side; when a side of the lower polarizer which is near the light incoming edge is located on a side of the array substrate

which faces the backlight module, and a stepped structure is formed between the lower polarizer and the array substrate, an adhesive strip is provided between the shading tape at the main body and at the light incoming corner of the light incoming edge and the array substrate, for compensating for the gap in a panel thickness direction between the shading tape and the array substrate.

[0012] Preferably, the adhesive strip provided between each the light incoming corner and the array substrate and the adhesive strip provided between the main body of the light incoming edge and the array substrate are separate from each other; in the side, which faces the display panel, of the adhesive strip provided between the light incoming corner and the array substrate and the adhesive strip provided between the main body of the light incoming edge and the array substrate, only the adhesive strip provided between the main body of the light incoming edge and the array substrate is provided with an adhesive layer.

[0013] Preferably, an adhesive layer is provided in the side, which faces the shading tape, of the adhesive strip provided between each the light incoming corner and the array substrate and the adhesive strip provided between the main body of the light incoming edge and the array substrate, and the side of the adhesive strips which faces the shading tape is stuck to the shading tape.

[0014] Preferably, the backlight module comprises two light strips, which are disposed oppositely to two opposite sides of the light guide plate, and accordingly there are two light incoming edges of the display panel.

BRIEF DESCRIPTION OF FIGURES

[0015]

Figure 1 is a structure schematic view of a display device provided by an embodiment of the invention;

Figure 2 is an arrangement schematic view of a shading tape and a display panel of a display device provided by an embodiment of the invention;

Figure 3 is an arrangement schematic view of a shading tape and a display panel of another display device provided by an embodiment of the invention;

Figure 4 is an arrangement schematic view of a shading tape and a display panel of another display device provided by an embodiment of the invention;

Figure 5 is an arrangement schematic view of a shading tape and a display panel of another display device provided by an embodiment of the invention.

[0016] Throughout the figures, like reference signs refer to like parts.

DETAIL EMBODIMENTS

[0017] The technical solutions in the embodiments of the invention will be described clearly and completely below in conjunction with the figures in the embodiments of the invention. Apparently, the embodiments described are only part of the embodiments of the invention, rather all of the embodiments. All other embodiments obtained by those ordinary skilled in the art based on the embodiments of the invention without expending creative effort are within the protection scope of the invention.

[0018] Please refer to Figs. 1, 2, 3, 4 and 5: therein Fig. 1 is a structure schematic view of a display device provided by an embodiment of the invention; Fig. 2 is an arrangement schematic view of a shading tape and a display panel of a display device provided by an embodiment of the invention; Fig. 3 is an arrangement schematic view of a shading tape and a display panel of another display device provided by an embodiment of the invention; Fig. 4 is an arrangement schematic view of a shading tape and a display panel of another display device provided by an embodiment of the invention; Fig. 5 is an arrangement schematic view of a shading tape and a display panel of another display device provided by an embodiment of the invention.

[0019] As shown in Figs. 1, 2 and 4, the display device provided by the invention comprises a display panel 1 and a backlight module 2, which backlight module 2 comprises a back plate 20, a light guide plate 21 and a light strip 22 mounted in the back plate 20, the display panel 1 having a polygon structure and being mounted on the back plate 20, and a shading tape 3 disposed along the edges of the display panel 1 being provided between the back plate 20 of the backlight module 2 and the display panel 1; in the edges of the display panel 1, an edge opposite to a side of the light strip 22 which faces the display panel 1 and having a extending direction parallel to that of the light strip 22 is a light incoming edge, that is, in the edges of the display panel 1, an edge close to the light strip 22 and having a extending direction parallel to that of the light strip 22 is the light incoming edge; each end of the light incoming edge forms a light incoming corner with an end of an adjacent edge, and the portion of the edge except the ends is a main body of the edge; the shading tape 30 provided at each light incoming corner, the shading tape 31 provided at the main body of the light incoming edge, and the shading tape 32 provided at the main body of the adjacent edge forming the light incoming corner with the light incoming edge have a separated structure, i.e. are separate from each other; in the side, which faces the display panel 1, of the shading tapes 3 provided at the edges of the display panel 1, only the shading tape provided at the parts of the edges of the display panel 1 except the light incoming corners is provided with an adhesive layer, i.e. is stuck to the display panel.

[0020] In the display device, the shading tape 30 provided at each light incoming corner, the shading tape 31

provided at the main body of the light incoming edge, and the shading tape 32 provided at the main body of the adjacent edge forming the light incoming corner with the light incoming edge have a separated structure; and only the shading tape 30 provided at the parts of the edges of the display panel 1 except the light incoming corners is provided with an adhesive layer, that is, the side, which faces the display panel 1, of the shading tape 30 provided at the light incoming corners is not provided with an adhesive layer, so the parts of the display panel 1 which correspond to the light incoming corners would not be stuck by the shading tape 30, and thus would not create extrusive stress due to the sticking of the shading tape 30. Therefore, a phenomenon of water ripple and light leakage does not easily occur in a portion of a display panel 1 which corresponds to a light incoming corner.

[0021] Accordingly, a phenomenon of water ripple and light leakage does not easily occur in a portion, which corresponds to a light incoming corner, of the display panel 1 of the display device.

[0022] As shown in Figs. 1, 2 and 4, in a specific embodiment, the backlight module 2 further comprises a prism 23 mounted in the back plate 20 and located between the light guide plate 21 and the display panel 1, a protection layer 24 located between the prism 23 and the display panel 1; the shading tape 3 is located between the display panel 1 and the protection layer 24 of the backlight module 2.

[0023] As shown in Figs. 1, 2 and 4, on the base of the above embodiment, in a specific embodiment, a side, which faces the backlight module 2, of the shading tape 3 provided at the edges of the display panel 1 is provided with an adhesive layer, and a side of the shading tape 3 which faces the backlight module 2 is stuck to the protection layer 24 of the backlight module 2 and to the back plate 20, for shielding the light coming into the edge of the display panel 1.

[0024] As shown in Figs. 1 and 2, on the base of the above embodiments, in a specific embodiment, the display panel 1 comprises a lower polarizer 10, an array substrate 11, a color film layer 12 and a upper polarizer 13 which are arranged in turn from the light incoming side to the light outgoing side; when a side of the lower polarizer 10 which is near the light incoming edge is located on a side of the array substrate 11 which faces the backlight module 2, and a stepped structure is formed between the lower polarizer 10 and the array substrate 11, an adhesive strip 4 is provided between the shading tape 3 at the light incoming edge and at the light incoming corner and the array substrate 11, and the adhesive strip 4 is able to compensate for the gap in a panel thickness direction between the shading tape 3 and the array substrate 11.

[0025] As shown in Figs. 4 and 5, when the side of the lower polarizer 10 which is located near the light incoming edge is aligned with the side of the array substrate 11 which is located near the light incoming edge, the adhesive strip 4 may also not been provided. Therein, Fig. 4 is a structure diagram of the display panel with one light incoming edge and without the adhesive strip, while Fig. 5 is a structure diagram of the display panel with two light incoming edges and without the adhesive strip.

[0026] As shown in Figs. 1 and 2, on the base of the above embodiments, in a specific embodiment, the adhesive strip 40 provided between each the light incoming corner and the array substrate 11 and the adhesive strip 41 provided between the main body of the light incoming edge and the array substrate 11 have a separated structure; in the side, which faces the display panel, of the adhesive strip 40 provided between the light incoming corner and the array substrate 11 and the adhesive strip 41 provided between the main body of the light incoming edge and the array substrate 11, only the adhesive strip 41 provided between the main body of the light incoming edge and the array substrate 11 is provided with an adhesive layer, and the side of the adhesive strip 41 which faces the display panel 1 is stuck to the array substrate 11.

[0027] Since the adhesive strip 40 provided between each the light incoming corner and the array substrate 11 and the adhesive strip 41 provided between the main body of the light incoming edge and the array substrate 11 have a separated structure, and the side, which faces the display panel 1, of the adhesive strip 40 provided between the light incoming corner and the array substrate 11 is not provided with an adhesive layer, the light incoming corner would not cause water ripple creating in the picture of the display panel 1 due to the extrusive stress generated by sticking adhesive strip 4. Therefore, a phenomenon of water ripple and light leakage does not occur in a portion, which corresponds to a light incoming corner, of the display panel 1, due to stick the adhesive strip 4.

[0028] As shown in Figs. 1 and 2, on the base of the above embodiments, in a specific embodiment, an adhesive layer is provided in the side, which faces the shading tape 3, of the adhesive strip 40 provided between each the light incoming corner and the array substrate 11 and the adhesive strip 41 provided between the main body of the light incoming edge and the array substrate 11, that is, the side of the adhesive strips 4 which faces the shading tape 3 is provided with an adhesive layer and is stuck to the shading tape 3.

[0029] As shown in Figs. 1 and 3, on the base of the above various embodiments, in a specific embodiment, the backlight module 2 may comprise two light strips 22, which are disposed oppositely to two opposite sides of the light guide plate 21. In this case, the display panel has two light incoming edges and four light incoming corners. The shading tape 30 provided at each light incoming corner of the display panel 1, the shading tape 31 provided at the main bodies of the light incoming edges, and the shading tape 32 provided at the main bodies of the adjacent edges forming the light incoming corners with the light incoming edges have a separated structure, and the side, which faces the display panel 1, of the shading

tape 30 provided at the light incoming corners is not provided with an adhesive layer, so the light incoming corners of the display panel 1 would not appear a phenomenon of water ripple and light leakage.

[0030] Apparently, those skilled in the art may make various amendments and variations to the embodiments of the invention without departing from the spirit and scope of the invention. As such, in case that these amendments and variations to the invention belong to the scope of the claims and the equivalents thereof in the invention, the invention is intended to include these amendments and variations. It should be noted that, the word "comprising" does not exclude the presence of elements or steps other than those listed in a claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

Claims

1. A display device, comprising a display panel and a backlight module, which backlight module comprises a back plate, a light guide plate and a light strip mounted in the back plate, the display panel being mounted on the back plate, and a shading tape disposed along the edges of the display panel being provided between the backlight module and the display panel; in the edges of the display panel, an edge close to the light strip and having a extending direction parallel to that of the light strip is a light incoming edge, and each end of the light incoming edge forms a light incoming corner with an end of an adjacent edge, **characterized in that**, the shading tape provided at each light incoming corner, the shading tape provided at the main body, except the ends, of the light incoming edge, and the shading tape provided at the main body, except the ends, of the adjacent edge forming the light incoming corner with the light incoming edge are separate from each other; in the side, which faces the display panel, of the shading tapes provided at the edges of the display panel, only the shading tape provided at the parts of the edges of the display panel except the light incoming corners is provided with an adhesive layer.

2. The display device according to claim 1, **characterized in that**, the side, which faces the backlight module, of the shading tapes provided at the edges of the display panel are all provided with the adhesive layer.

3. The display device according to claim 1, **characterized in that**, the shading tape is located between the display panel and the back plate.

4. The display device according to claim 1, **characterized in that**, the backlight module further comprises a prism mounted in the back plate and located between the light guide plate and the display panel, a protection layer located between the prism and the display panel; the shading tape is located between the display panel and the protection layer of the backlight module.

5. The display device according to claim 4, **characterized in that**, the display panel comprises a lower polarizer, an array substrate, a liquid crystal layer, a color film layer and a upper polarizer which are arranged in turn from the light incoming side to the light outgoing side; when a side of the lower polarizer which is near the light incoming edge is located on a side of the array substrate which faces the backlight module, and a stepped structure is formed between the lower polarizer and the array substrate, an adhesive strip is provided between the shading tape at the light incoming edge and at the light incoming corner and the array substrate, for compensating for the gap in a panel thickness direction between the shading tape and the array substrate.

6. The display device according to claim 5, **characterized in that**, the adhesive strip provided between each the light incoming corner and the array substrate and the adhesive strip provided between the main body of the light incoming edge and the array substrate are separate from each other; in the side, which faces the display panel, of the adhesive strip provided between the light incoming corner and the array substrate and the adhesive strip provided between the main body of the light incoming edge and the array substrate, only the adhesive strip provided between the main body of the light incoming edge and the array substrate is provided with an adhesive layer.

7. The display device according to claim 6, **characterized in that**, an adhesive layer is provided in the side, which faces the shading tape, of the adhesive strip provided between each the light incoming corner and the array substrate and the adhesive strip provided between the main body of the light incoming edge and the array substrate, and the side of the adhesive strips which faces the shading tape is stuck to the shading tape.

8. The display device according to any one of claim 1-7, **characterized in that**, the backlight module comprises two light strips, which are disposed oppositely to two opposite sides of the light guide plate, and accordingly there are two light incoming edges of the display panel.

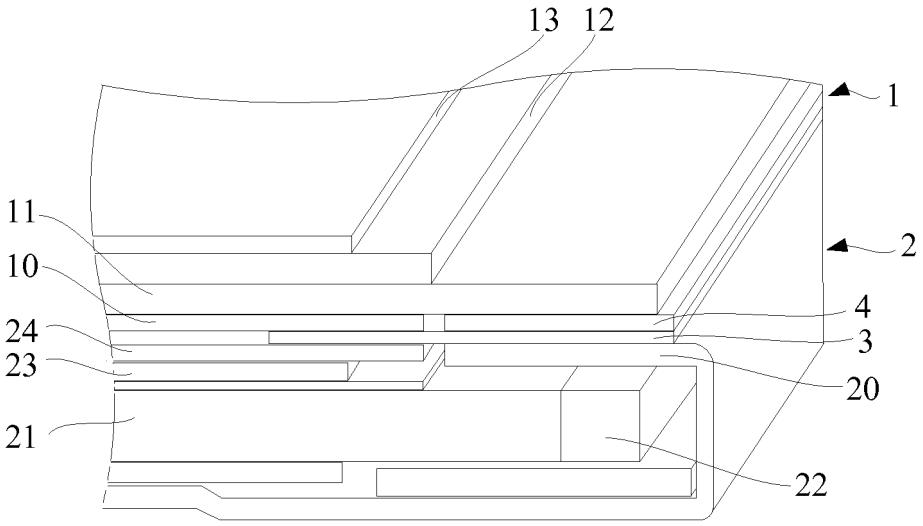

Fig.1

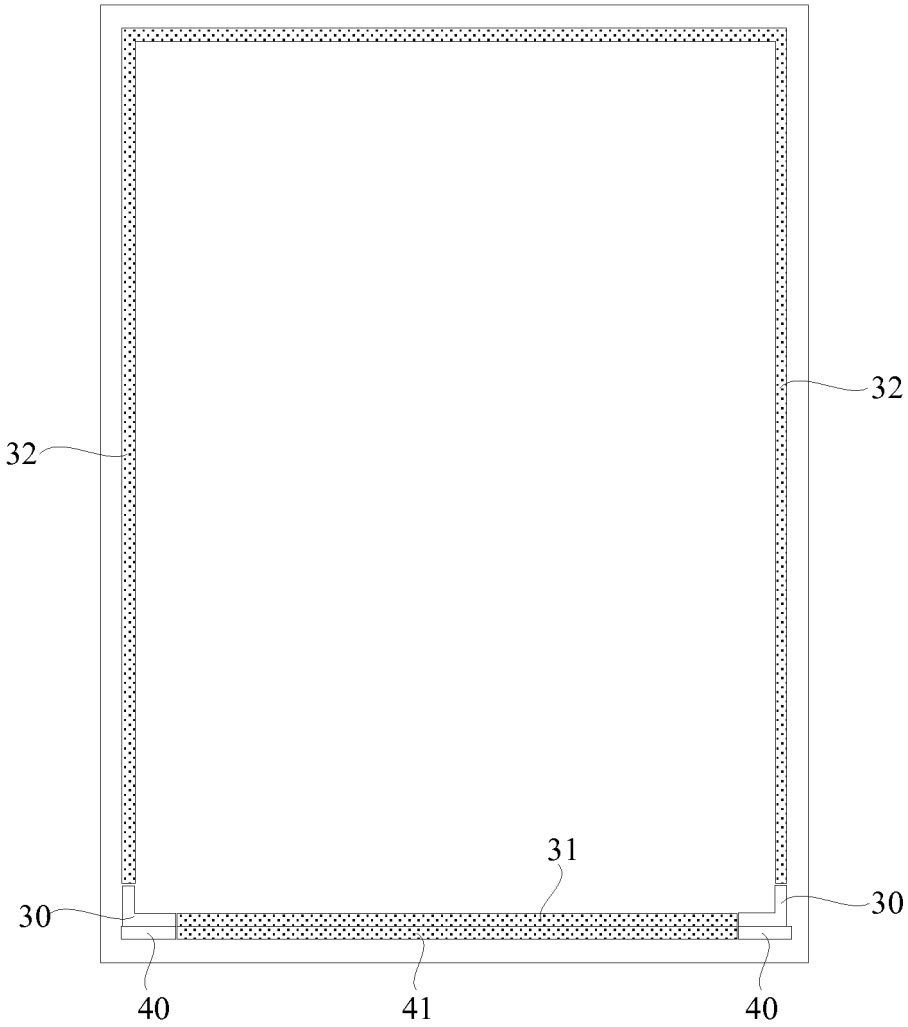

Fig.2

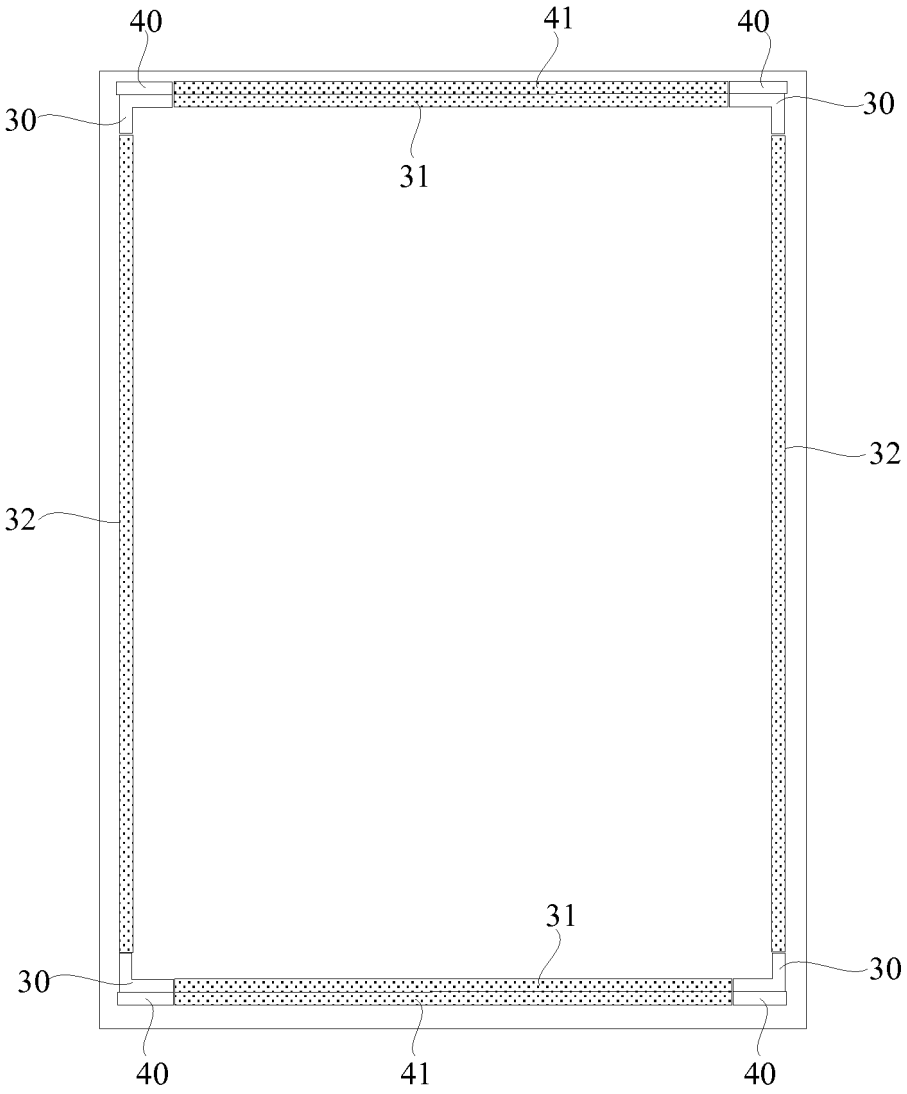

Fig.3

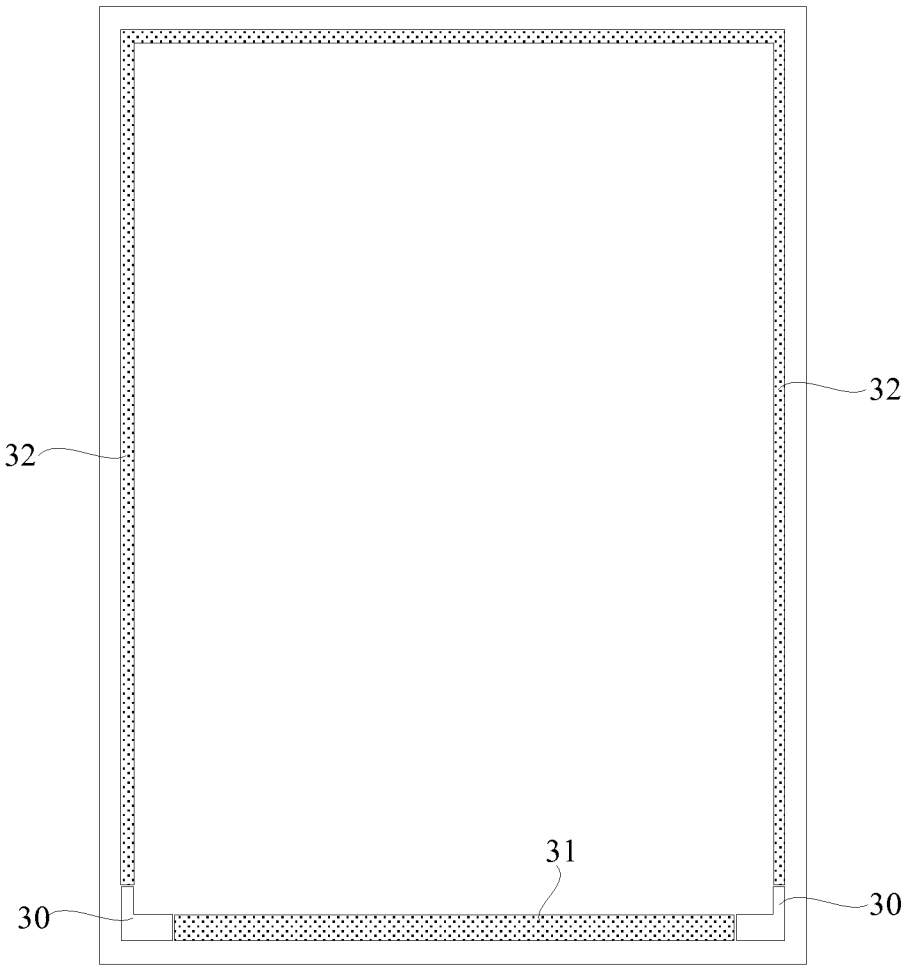

Fig.4

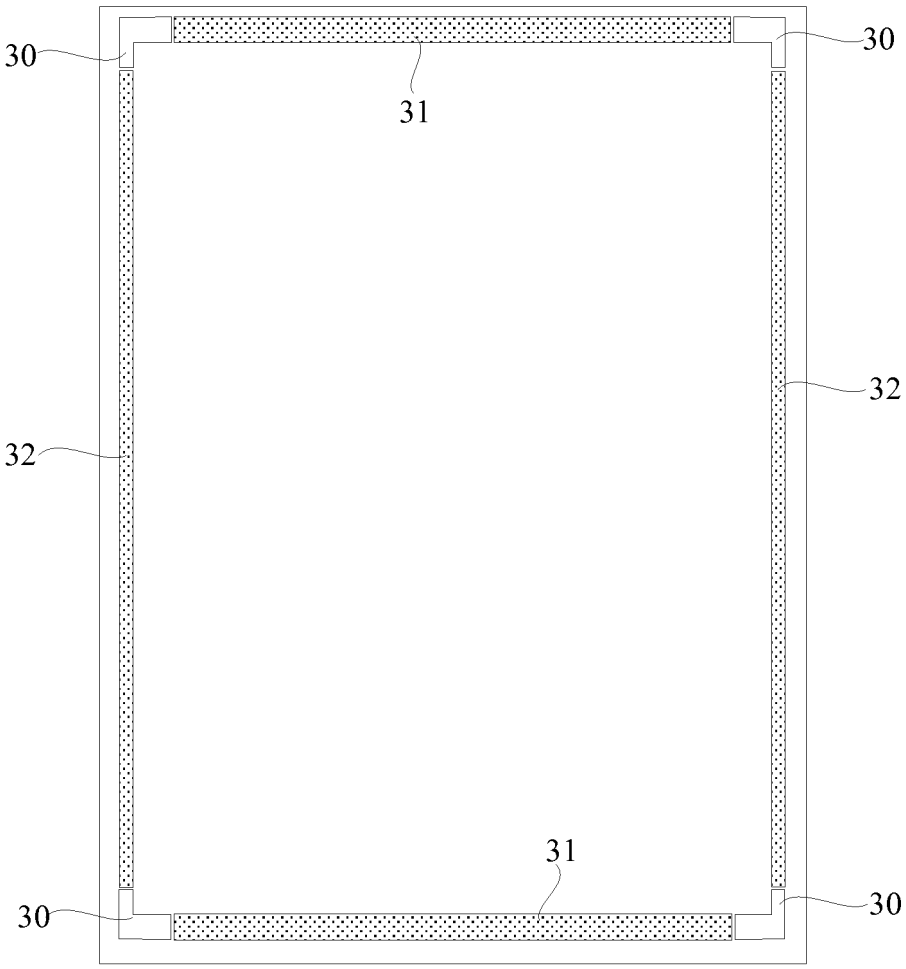

Fig.5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2015/084353

A. CLASSIFICATION OF SUBJECT MATTER

G02F 1/13357 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI; EPQDOC; CNPAT; CNKI; IEEE: liquid crystal panel, back light module, shading tape, rubber surface, rubber layer, end portion, liquid display, back plate, shading adhesive tape, corner, stress, extrusion, water ripple, light leakage

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 104570485 A (BEIJING BOE CHATANI ELECTRONICS CO., LTD. et al.), 29 April 2015 (29.04.2015), claims 1-8	1-8
A	CN 203561805 U (SHANGHAI TIANMA MICRO-ELECTRONICS CO., LTD. et al.), 23 April 2014 (23.04.2014), description, pages 1-3, and figures 2-4	1-8
A	CN 204127794 U (XIAMEN TIANMA MICROELECTRONICS CO. LTD. et al.), 28 January 2015 (28.01.2015), the whole document	1-8
A	CN 203757522 U (BEIJING BOE CHATANI ELECTRONICS CO., LTD. et al.), 06 August 2014 (06.08.2014), the whole document	1-8
A	US 2009033819 A1 (SEIKO EPSON CORP.), 05 February 2009 (05.02.2009), the whole document	1-8
A	US 2013070180 A1 (KURIYAMA, T.), 21 March 2013 (21.03.2013), the whole document	1-8

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 September 2015 (17.09.2015)	**13 October 2015 (13.10.2015)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **LIU, Ying** Telephone No.: (86-10) **62413581**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2015/084353

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 104570485 A	29 April 2015	None	
CN 203561805 U	23 April 2014	None	
CN 204127794 U	28 January 2015	None	
CN 203757522 U	06 August 2014	None	
US 2009033819 A1	05 February 2009	US 7800718 B2	21 September 2010
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		CN 102918576 A	06 February 2013
		EP 2568465 A4	23 July 2014
		CN 102918576 B	25 February 2015
		WO 2011162019 A1	29 December 2011

Form PCT/ISA/210 (patent family annex) (July 2009)